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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/749,971	12/31/2003	Galen W. Kulp	C-2884	9671

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EXAMINER	
RHEE, JANE J	

ART UNIT	PAPER NUMBER
1745	

DATE MAILED: 05/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/749,971	KULP ET AL.	
	Examiner	Art Unit	
	Jane Rhee	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/31/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reiser et al. (US20020076583) in view of Voss (6926981) and in further view of Perry.

As to claim 1, Reiser et al. discloses a procedure for starting up a vacuum fuel cell system, the system including at least one fuel cell (figure 1 number 102), having a cathode (figure 1 number 106) secured adjacent one side of an electrolyte layer (figure 1 number 108), an anode (figure 1 number 104) secured adjacent an opposed side of the electrolyte layer wherein the cathode includes a cathode catalyst (figure 1 number 26) supported on a carbon support, a cathode flow field defined adjacent the cathode (figure 1 number 122) and an anode flow field defined adjacent the anode (figure 1 number 128) wherein both the cathode and anode flow fields are filled with air (page 3 paragraph 0022) and a primary electricity using device (figure 1 number 146) is disconnected from the fuel cell power circuit during a shut down of the fuel cell (page 2 paragraph 0014), the procedure comprising the steps of purging the air from the anode flow field (page 4 paragraph 0033), then delivering a continuous flow of hydrogen fuel into the anode flow field (page 4 paragraph 0033), then delivering a flow of oxidant into

the cathode flow field (figure 1 number 142 and 122), and then connecting the primary load to the fuel cell power circuit (figure 1 number 146).

Reiser et al. fail to disclose the procedure comprising the step of applying a vacuum to the anode flow field.

Voss teaches that purging step can comprise withdrawing the gaseous and/or liquid contents of the portion of the fuel cell through the fuel cell inlet of the fuel stream outlet, and/or withdrawing the contents of the portion of the fuel cell stack by operation of a vacuum pump (col. 5 lines 24-29). Voss teaches this improved fuel cell system to reduce or eliminate leakage of fuel from the fuel cell to the surrounding environment (col. 3 lines 24-25).

Therefore, it would have been obvious to one having ordinary skill in the art at the time applicant's invention was made to provide the step of applying a vacuum to the anode field in order to reduce or eliminate leakage of fuel from the fuel cell to the surrounding environment as taught by Voss.

As to claim 2, Reiser et al. fail to disclose that the step of applying the vacuum to the anode field includes applying a vacuum until an absolute pressure within the anode flow field is between about 60kPa to about 85kPa.

Voss teaches that the fuel stream can be supplied to a fuel cell stack at a pressure below atmospheric pressure which is generally about 14.7 pounds per square inch which is about 100kPa (col. 5 lines 53-54).

It would have been obvious to one having ordinary skill in the art at the time applicant's invention was made to provide Reiser et al. with 60kPa to about 85kPa,

since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art in absence of unexpected results.

As to claim 3, Reiser et al. fail to disclose wherein the step of applying the vacuum further comprises applying a vacuum to the cathode flow field. As to claims 4 and 5, Reiser et al. fail to disclose wherein the step of applying the vacuum to the cathode flow field includes applying a vacuum until an absolute pressure within the cathode flow field is between 5 kPa to about 15kPa or applying a vacuum to the anode flow field includes applying a vacuum until an absolute pressure within the cathode flow field is between 5 kPa to about 15kPa.

Perry teaches that positive purges of both the fuel reactant channels and the oxidant reactant channels serve to displace the respective reactants and terminate or prevent unwanted reactions in the anode and cathode (col. 7 lines 3-7).

Thererefore, since Voss teaches that purging can be done via vacuum pump as described above, it would have been obvious to one having ordinary skill in the art at the time applicant's invention was made to provide Reiser et al. with applying a vacuum to the cathode flow field in order to displace the respective reactants and terminate or prevent unwanted reactions in the anode and cathode (col. 7 lines 3-7) as taught by Perry.

As to applying the vacuum to the cathode flow field includes applying a vacuum until an absolute pressure within the cathode flow field is between 5 kPa to about 15kPa or applying a vacuum to the anode flow field includes applying a vacuum until an absolute pressure within the cathode flow field is between 5 kPa to about 15kPa, it

would have been obvious to one having ordinary skill in the art at the time applicant's invention was made to provide Reiser et al. with the cathode flow field is between 5 kPa to about 15kPa or applying a vacuum to the anode flow field includes applying a vacuum until an absolute pressure within the cathode flow field is between 5 kPa to about 15kPa, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art in absence of unexpected results.

As to claim 6, Reiser et al. discloses wherein the vacuum fuel cell system includes a porous water transport plate (figure 1 number 131) secured in direct fluid communication with the anode flow field for directing a liquid coolant to pass through the water transport plate (figure 1 number 131).

Reiser et al. fail to disclose a coolant accumulator, wherein the step of applying a vacuum to the anode flow field further comprises applying a vacuum to the coolant accumulator so that the vacuum level applied to the anode flow field is about the same as the vacuum level applied to the coolant accumulator.

Perry teaches a coolant accumulator (figure 1 number 50), and purging a fuel cells system with coolant for the purpose of displacing the respective reactants and terminate or prevent unwanted reactions in the anode and cathode (col. 7 lines 3-7).

Thererefore, since Voss teaches that purging can be done via vacuum pump as described above, it would have been obvious to one having ordinary skill in the art at the time applicant's invention was made to provide Reiser et al. with a coolant accumulator, wherein the vacuum source means is secured in fluid communication with the coolant accumulator for selectively applying a vacuum to the coolant accumulator so

that the vacuum applied to the anode flow field is about the same as the vacuum applied to the coolant accumulator in order to displace the respective reactants and terminate or prevent unwanted reactions in the anode and cathode (col. 7 lines 3-7) as taught by Perry.

As to claim 7, Reiser et al.discloses the steps of connecting an auxiliary load to the fuel cell power circuit prior to the step of delivering the continuous flow of hydrogen fuel, disconnecting the auxiliary load from the fuel cell power prior to the step of delivering a flow of oxidant to the cathode flow field (page 2 paragraph 0015 and figure 1 number 148).

2. Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reise et al. in view of Voss and in further view of Perry et al. (6391485).

As to claim 8, Reiser et al. discloses a vacuum fuel system, comprising at least one fuel cell (figure 1 number 102) having a cathode (figure 1 number 106) secured adjacent to one side of an electrolyte layer (figure 1 number 108), an anode secured adjacent tan opposed side of the electrolyte layer (figure 1 number 104), wherein the cathode includes a cathode catalyst support on a carbon support (figure 1 number 112), a cathode flow field defined adjacent the cathode for directing an oxygen containing oxidant to flow adjacent the cathode (figure 1 number 120) and an anode flow field defined adjacent the anode for directing a hydrogen containing reducing fluid to flow adjacent the anode (figure 1 number 118), an oxidant inlet valve (figure 1 number 158), a fuel inlet valve (figure 1 number 166), and a fuel outlet valve secured in fluid

communication with the anode flow field for permitting the prohibiting flow of the fuel through the anode flow field (figure 1 number 172).

Reiser et al. fail to disclose an oxidant exhaust valve secured in fluid communication with the cathode flow field, for permitting and prohibiting flow of the oxidant through the cathode flow field and a vacuum source means secured in fluid communication with the anode flow field for selectively applying a vacuum to the anode flow field when the fuel inlet valve and fuel exhaust valve are closed to prohibit flow of the fuel through the anode flow field.

Voss teaches that purging step can comprise withdrawing the gaseous and/or liquid contents of the portion of the fuel cell through the fuel cell inlet of the fuel stream outlet, and/or withdrawing the contents of the portion of the fuel cell stack by operation of a vacuum pump (col. 5 lines 24-29). Voss teaches this improved fuel cell system to reduce or eliminate leakage of fuel from the fuel cell to the surrounding environment (col. 3 lines 24-25).

Therefore, it would have been obvious to one having ordinary skill in the art at the time applicant's invention was made to provide Reiser et al. with a vacuum to the anode field in order to reduce or eliminate leakage of fuel from the fuel cell to the surrounding environment as taught by Voss.

As to the oxidant exhaust valve, Perry teaches an oxidant exhaust valve secured in fluid communication with the cathode flow field (figure 1 number 68) for the purpose of controlling the oxidant that flows out of the oxidant conduit (col. 5 lines 5-6).

Therefore,it would have been obvious to one having ordinary skill in the art at the time applicant's invention was made to provide Reiser et al. with an oxidant exhaust valve secured in fluid communication with the cathode flow field in order to control the oxidant that flows out of the oxidant conduit (col. 5 lines 5-6).

As to claim 9, Reiser et al. fail to disclose wherein the vacuum source means is also secured in fluid communication with the cathode flow field applying a vacuum when the oxidant inlet valve and oxidant exhaust valve are closed to prohibit flow of the oxidant through the cathode flow field.

Perry teaches that positive purges of both the fuel reactant channels and the oxidant reactant channels serve to displace the respective reactants and terminate or prevent unwanted reactions in the anode and cathode (col. 7 lines 3-7).

Thererefore, since Voss teaches that purging can be done via vacuum pump as described above, it would have been obvious to one having ordinary skill in the art at the time applicant's invention was made to provide Reiser et al. with the vacuum source means that is also secured in fluid communication with the cathode flow field applying a vacuum when the oxidant inlet valve and oxidant exhaust valve are closed to prohibit flow of the oxidant through the cathode flow field in order to displace respective reactants and terminate or prevent unwanted reactions in the cathode as taught by Perry.

As to claim 10, Reiser et al. discloses wherein as porous water transport plate (figure 1 number 131) secured in direct fluid communication with the anode flow field

(figure 1number 118) for directing a liquid coolant to pass through the water transport plate.

Reiser et al. fail to disclose a coolant accumulator, wherein the vacuum source means is secured in fluid communication with the coolant accumulator for selectively applying a vacuum to the coolant accumulator so that the vacuum applied to the anode flow field is about the same as the vacuum applied to the coolant accumulator.

Perry teaches a coolant accumulator (figure 1 number 50), and purging a fuel cells system with coolant for the purpose of displacing the respective reactants and terminate or prevent unwanted reactions in the anode and cathode (col. 7 lines 3-7).

Thererefore, since Voss teaches that purging can be done via vacuum pump as described above, it would have been obvious to one having ordinary skill in the art at the time applicant's invention was made to provide Reiser et al. with a coolant accumulator, wherein the vacuum source means is secured in fluid communication with the coolant accumulator for selectively applying a vacuum to the coolant accumulator so that the vacuum applied to the anode flow field is about the same as the vacuum applied to the coolant accumulator in order to displace the respective reactants and terminate or prevent unwanted reactions in the anode and cathode (col. 7 lines 3-7) as taught by Perry.

As to claim 11, Resier et al. discloses an axuilaiary load secured in electrical communication with a fuel cell power circuit for selectively controlling fuel cell voltage (figure 1 number 148).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jane Rhee whose telephone number is 571-272-1499. The examiner can normally be reached on M-F 9-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jane Rhee
April 2,2006

PATRICK JOSEPH RYAN
SUPERVISORY PATENT EXAMINER